Entergy

Entergy Operations, Inc.
River Bend Station
5485 U.S. Highway 61N
St. Francisville, LA 70775
Tel 225 381 4157
Fax 225 635 5068
dlorfin@entergy.com

David N. Lorfing
Manager-Licensing

May 2, 2008

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Licensee Event Report 50-458 / 08-002-00
River Bend Station – Unit 1
Docket No. 50-458
License No. NPF-47

File Nos. G9.5

RBG-46813
RBF1-08-0043

Dear Sir or Madam:

In accordance with 10CFR50.73, enclosed is the subject Licensee Event Report. This document contains no commitments.

Sincerely,

David N. Lorfing

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Manager – Licensing

DNL/dhw
Enclosure

IE22
NRR

cc: U. S. Nuclear Regulatory Commission
Region IV
612 East Lamar Blvd., Suite 400
Arlington, TX 76011-4125

NRC Sr. Resident Inspector
P. O. Box 1050
St. Francisville, LA 70775

INPO Records Center
E-Mail

Mr. Jim Calloway
Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, TX 78711-3326

Mr. Jeffrey P. Meyers
Louisiana Department of Environmental Quality
Attn: OEC-ERSD
P.O. Box 4312
Baton Rouge, LA 70821-4312

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)	Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
River Bend Station – Unit 1	05000-458	1 of 3

4. TITLE
Automatic Reactor Scram Due to Malfunction of Main Turbine Control System

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
03	05	2008	2008	- 002 -	00	05	02	2008	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
60	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
David N. Lorfing, Manager – Licensing	225-381-4157

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
na									

14. SUPPLEMENTAL REPORT EXPECTED		15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)*	☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On March 5, 2008, at 2:43 p.m. CST, an automatic reactor scram occurred while the plant was operating at 60 percent power. The scram signal was initiated by high steam pressure in the reactor, and all control rods inserted as designed. The initial pressure transient caused the automatic actuation of nine main steam safety-relief valves. Reactor water level momentarily decreased to Level 3 immediately following the scram, resulting in the automatic closure of the containment isolation valves in the suppression pool cleanup system. Reactor pressure and water level were promptly stabilized following the initial transient. A malfunction in the main turbine control system resulting from a loose, oil-contaminated electrical connector apparently produced an errant turbine speed error signal. This signal caused a closure of the turbine control valves, resulting in high reactor steam pressure. The connector was cleaned and reassembled. A preventative maintenance task will be developed to inspect this and similar connectors periodically. This event is being reported in accordance with 10CFR50.73(a)(2)(iv)(A) as an unplanned actuation of the reactor protection system and the primary containment isolation system.

REPORTED CONDITION

On March 5, 2008, at 2:43 p.m. CST, an automatic reactor scram occurred while the plant was operating at 60 percent power. The scram signal was initiated by high steam pressure in the reactor, and all control rods inserted as designed. The initial pressure transient caused the automatic actuation of nine main steam safety-relief valves. Reactor water level momentarily decreased to Level 3 immediately following the scram, resulting in the automatic closure of the containment isolation valves in the suppression pool cleanup system. Reactor pressure and water level were promptly stabilized following the initial transient. There were no safety related systems out of service at the time of the event.

This event is being reported in accordance with 10CFR50.73(a)(2)(iv)(A) as an unplanned actuation of the reactor protection system and the primary containment isolation system.

CAUSAL ANALYSIS

Following the event, a cross-discipline team, including a vendor representative, was assembled to investigate the cause of the scram. Data from the emergency response information system and the plant process computer were collected for analysis.

The main turbine electrohydraulic control (EHC) (IT) system comprises three major subsystems – the speed control unit, the load control unit, and the valve flow control unit. The speed control unit compares actual turbine speed with the speed reference, compares actual acceleration with the acceleration reference, and provides one speed error signal to the load control unit.

The load control unit combines the speed error signal with the load reference signal to determine the desired steam flow signals for the main turbine stop valves, control valves, and intercept valves. Finally, the valve flow control unit positions the appropriate valves to obtain the desired steam flows through the turbine.

The speed control unit has two loops – the primary speed sensor loop and the backup speed sensor loop. These loops are nearly identical with the exception of the acceleration amplifier signal being added to the speed amplifier signal for the creation of the speed error signal. During normal operation with no acceleration, the speed error signal should be zero or slightly negative regardless of load.

A detailed sequence of events leading up to the scram was assembled from the computer data. At the onset of the event, the speed signal appears to have momentarily dropped out. This condition would not have, by itself, led to the conditions that resulted in the scram. However, the drop-out was intermittent, and when the signal returned, the logic sensed this as a step increase indicative of a turbine over-acceleration, resulting in the high speed error signal. The system subsequently commanded a control valve closure. The closure of the control valves caused the high steam pressure condition in the reactor, resulting in the reactor scram signal.

Troubleshooting of the EHC circuits was conducted, which identified an abnormal resistance across the primary speed probe. The impedance reading through primary speed sensor pickup was approximately

130 ohms, as compared to an expected value of 80 ohms. During removal of speed sensor pickup, impedance dropped to within the normal range. This response indicates that vibration could have affected the connection in the same manner, causing the primary speed sensor signal to momentarily drop off, then return to normal. The most probable cause of the false speed error signal was a loose, oil-contaminated Amphenol connection (**CON**) in the primary speed probe pickup circuit, allowing for an increased impedance and intermittent loss of the pickup signal.

Additionally, the team noted that the speed pickup and connector assembly operate in a hot, high-vibration, oily environment. There is no periodic inspection of the connectors to ensure that oil contamination or corrosion are not potentially leading to a faulty connection.

CORRECTIVE ACTIONS TO PREVENT RECURRENCE

The investigation team developed the following actions to prevent recurrence. These items are being tracked in the station's corrective action program.

1. Establish a preventative maintenance task (effective until the installation of a planned digital EHC upgrade modification) for the inspection of the speed probes and connector for oil contamination, pin/receptacle deformation, connector tightness, corrosion, and electrical resistance of the completed assembly.

2. The cable assembly will be scheduled for replacement in a future outage. Replaced cables will be inspected for additional fault identification.

3. Review and/or update maintenance procedures for tightening electrical connectors, and for using a thread-locking compound to secure connector used in severe environments

PREVIOUS OCCURRENCE EVALUATION

No reactor scrams at River Bend Station have occurred in the last five years as a result of the same failure mechanism that caused this event.

SAFETY SIGNIFICANCE

All safety related systems operated as designed during the scram. There was no actuation of the standby diesel generators or the emergency core cooling systems. This event was of minimal significance with regard to the health and safety of the public and plant personnel.

(NOTE: Energy Industry Component Identification codes are annotated as (**XX**).)